



Posttest

If you have completed all 20 lessons in this book, you are ready to take the posttest to measure your progress. The posttest has 50 multiple-choice questions covering the topics you studied in this book. Although the format of the posttest is similar to that of the pretest, the questions are different.

Take as much time as you need to complete the posttest. When you are finished, check your answers with the answer key that follow the posttest. Along with each answer is a number that tells you which lesson of this book teaches you about the calculus skills needed for that question. Once you know your score on the posttest, compare the results with the pretest. If you scored better on the posttest than you did on the pretest, congratulations! You have profited from your hard work. At this point, you should look at the questions you missed, if any. Do you know why you missed the question, or do you need to go back to the lesson and review the concept?

ANSWER SHEET

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If your score on the posttest doesn't show much improvement, take a second look at the questions you missed. Did you miss a question because of an error you made? If you can figure out why you missed the problem, then you understand the concept and simply need to concentrate more on accuracy when taking a test. If you missed a question because you did not know how to work the problem, go back to the lesson and spend more time working that type of problem. Take the time to understand basic calculus thoroughly. You need a solid foundation in basic calculus if you plan to use this information or progress to a higher level. Whatever your score on this posttest, keep this book for review and future reference.

► Posttest

1. Evaluate $f(-2)$ when $f(x) = x^3 - 2x$.

- a. -12
- b. -10
- c. -4
- d. 4

2. Simplify $f(2x + 1)$ when $f(x) = x^2 + x$.

- a. $4x^2 + 6x + 2$
- b. $4x^2 + 2x + 2$
- c. $2x^2 + 3x$
- d. $2x^3 + 3x^2 + x$

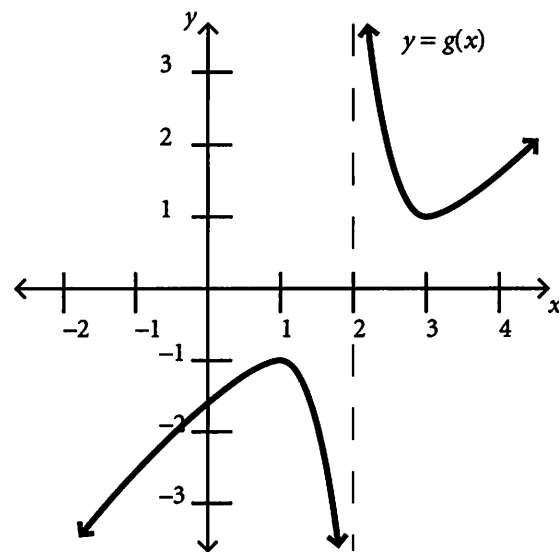
3. Evaluate $g \circ h(x)$ when $g(x) = x^2 + 5x + 1$ and $h(x) = \frac{1}{x}$.

- a. $\frac{6}{x}$
- b. $x + 5 + \frac{1}{x}$
- c. $\frac{1}{x^2 + 5x + 1}$
- d. $\frac{1}{x^2} + \frac{5}{x} + 1$

4. What is the domain of $f(x) = \frac{\sqrt{x+1}}{x}$?

- a. $x \geq -1$
- b. $x \neq 0$
- c. $x \neq -1, x \neq 0$
- d. $x \geq -1, x \neq 0$

Use the following graph for problems 5 and 6.



5. Where does $g(x)$ have a local maximum?

- a. $x = 0$
- b. $x = 1$
- c. $x = 2$
- d. $x = 3$

6. Where is $g(x)$ decreasing?

- a. $(1,2)$ and $(2,3)$
- b. $(-\infty,2)$
- c. $(-\infty,0)$
- d. $(0,\infty)$

7. What is the slope of the line through $(2,-4)$ and $(1,7)$?

- a. $\frac{1}{11}$
- b. -11
- c. 11
- d. 3

8. Simplify 4^3 .

- a. 7
- b. 12
- c. 16
- d. 64

9. Simplify $16^{-\frac{1}{2}}$.

- a. -8
- b. 4
- c. $\frac{1}{4}$
- d. $\frac{1}{16}$

10. What is x if $4^x = 10$?

- a. $\frac{\ln(10)}{\ln(4)}$
- b. 2.5
- c. 10^4
- d. $\ln\left(\frac{5}{2}\right)$

11. What is $\cos\left(\frac{\pi}{4}\right)$?

- a. 1
- b. $\frac{1}{2}$
- c. $\frac{\sqrt{2}}{2}$
- d. $\frac{\sqrt{3}}{2}$

12. What is $\sin\left(\frac{4\pi}{3}\right)$?

- a. $-\frac{\sqrt{3}}{2}$
- b. $\frac{\sqrt{3}}{2}$
- c. $-\frac{\sqrt{2}}{2}$
- d. $\frac{\sqrt{2}}{2}$

13. Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 2x - 3}$.

- a. 0
- b. 1
- c. $\frac{2}{3}$
- d. undefined

14. Simplify $\lim_{x \rightarrow 3} \frac{x^2 - 5x + 6}{x^2 - 2x - 3}$.

- a. $\frac{1}{3}$
- b. $\frac{1}{4}$
- c. 1
- d. undefined

15. Evaluate $\lim_{x \rightarrow 1^+} \frac{x + 4}{x^2 - 1}$.

- a. 5
- b. $-\infty$
- c. ∞
- d. undefined

16. What is the slope of the tangent line to $y = x^2$ at $x = 3$?

- a. 2
- b. 6
- c. 9
- d. $2x$

17. What is the slope of the tangent line to $y = 4x - 7$ at $x = 2$?

- a. -7
- b. -3
- c. 1
- d. 4

18. What is the derivative of $g(x) = 8x^4 - 10x^3 + 3x - 1$?

- a. 0
- b. $8x^4 - 10x^3 + 3x$
- c. $32x^3 - 10x^2 + 3x - 1$
- d. $32x^3 - 30x^2 + 3$

19. Suppose that after t seconds, a falling rock is $s(t) = -16t^2 + 5t + 200$ feet off the ground. How fast is the rock traveling after 2 seconds?

- a. 10 feet per second
- b. 59 feet per second
- c. 64 feet per second
- d. 156 feet per second

20. Differentiate $y = \sqrt{x} + 4\sin(x)$.

- a. $\frac{1}{2\sqrt{x}} + 4\cos(x)$
- b. $\sqrt{x} + 4\cos(x)$
- c. $\frac{\sqrt{x}}{2} + 4\sin(x)$
- d. $\frac{1}{2\sqrt{x}} - 4\cos(x)$

21. What is the derivative of $f(x) = 5e^x - 2\ln(x)$?

- a. $5e^x - \frac{2}{x}$
- b. $5xe^{x-1} - \frac{2}{x}$
- c. $5xe^{x-1} - 2x$
- d. $5e^x - 2x$

22. Differentiate $y = xe^x$.

- a. e^x
- b. xe^x
- c. $(x + 1)e^x$
- d. xe^{x-1}

23. Differentiate $g(x) = \frac{\cos(x)}{x^2 + 5x}$.

- a. $\frac{\sin(x)}{2x + 5}$
- b. $\frac{-\sin(x)}{2x + 5}$
- c. $\frac{(2x + 5)\cos(x) + (x^2 + 5)\sin(x)}{(x^2 + 5)^2}$
- d. $\frac{-(x^2 + 5x)\sin(x) - (2x + 5)\cos(x)}{(x^2 + 5x)^2}$

24. What is the derivative of $f(x) = \sec(x)$?

- a. $\sec(x)$
- b. $\tan^2(x)$
- c. $\sec(x)\tan(x)$
- d. $1 - \sec(x)$

25. What is the slope of the line that is tangent to $y = (x^2 - 2)^3$ at $x = 2$?

- a. 8
- b. 12
- c. 24
- d. 48

26. Differentiate $x\sin(x^2)$.

- a. $x\cos(x^2) + \sin(x^2)$
- b. $2x^2\cos(x^2) + \sin(x^2)$
- c. $2x^2\cos(x^2)$
- d. $2x\sin(x^2)$

27. Find $\frac{dy}{dx}$ when $\tan(y) + y = \ln(x) - 1$.

- a. $\frac{1}{x} - \sec^2(x)$
- b. $\frac{1}{x(1 + \sec^2(x))}$
- c. $\frac{x}{1 + \sec^2(x)}$
- d. $\frac{1}{x} - \sec^2(x) - 1$

28. Find $\frac{dy}{dx}$ when $x^2y = xy^2$.

a. $\frac{x}{y}$

b. $\frac{y - 2x}{x - 2y}$

c. $\frac{y^2 - 2xy}{x^2 - 2xy}$

d. $\frac{y^2 + 2xy}{x^2 + 2xy}$

29. What is the slope of the curve $y^3 - y = 3x + 3$ at (1,2)?

a. $\frac{3}{11}$

b. 3

c. $\frac{2\sqrt{3}}{3}$

d. $\frac{5\sqrt{3}}{3}$

30. The volume of a sphere is $V = \frac{4}{3}\pi r^3$. If the radius increases by 3 meters per second, how fast does the volume change when $r = 10$ meters?

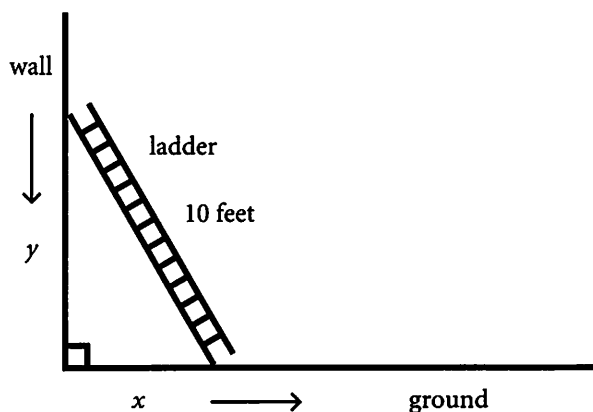
a. $400\pi \frac{\text{m}^3}{\text{sec}}$

b. $\frac{4,000\pi \text{ m}^3}{3 \text{ sec}}$

c. $4,000\pi \frac{\text{m}^3}{\text{sec}}$

d. $1,200\pi \frac{\text{m}^3}{\text{sec}}$

31. If a 10-foot ladder slides down a wall at 2 feet per minute (see the figure that follows), how fast does the bottom slide when the top is 6 feet up?



a. $\frac{1}{2}$ foot per minute

b. $\frac{3}{2}$ foot per minute

c. 2 feet per minute

d. 12 feet per minute

32. What is $\lim_{x \rightarrow \infty} \frac{3x^2 + 7x - 2}{x^2 + 5x - 1}$?

a. 3

b. $\frac{7}{5}$

c. ∞

d. undefined

33. Where does $y = e^x$ have a horizontal asymptote?

a. $y = 0$

b. $y = 1$

c. $y = e$

d. no asymptote

34. Evaluate $\lim_{x \rightarrow \infty} \frac{x^5 + 3x^3}{e^x - 1}$.

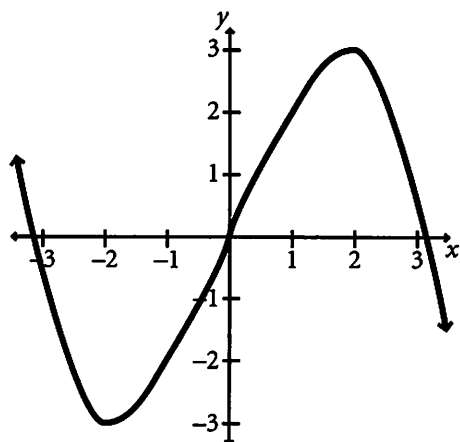
- a. 5
- b. 0
- c. ∞
- d. undefined

35. On what intervals is $f(x) = x^3 + 6x^2 - 15x + 2$ decreasing?

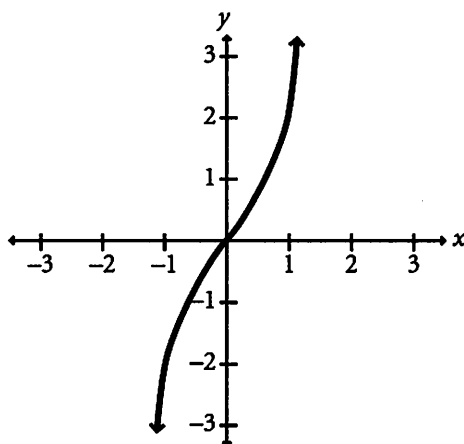
- a. (4,5)
- b. (-5,1)
- c. (2,6) and (15, ∞)
- d. $(-\infty, -5)$ and $(1, \infty)$

36. Which of the following is the graph of $y = 3x - x^3$?

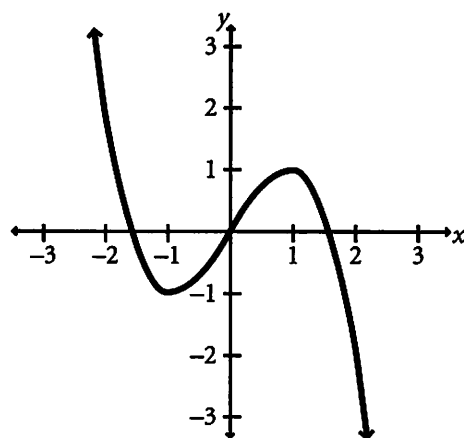
a.



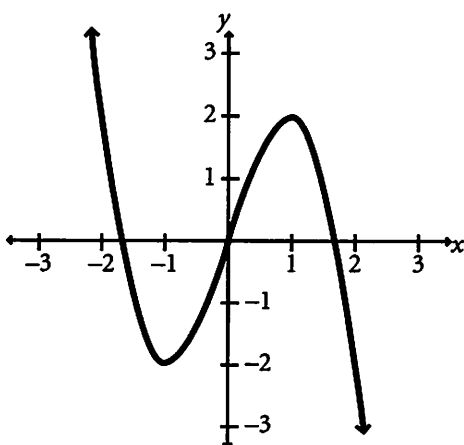
b.



c.



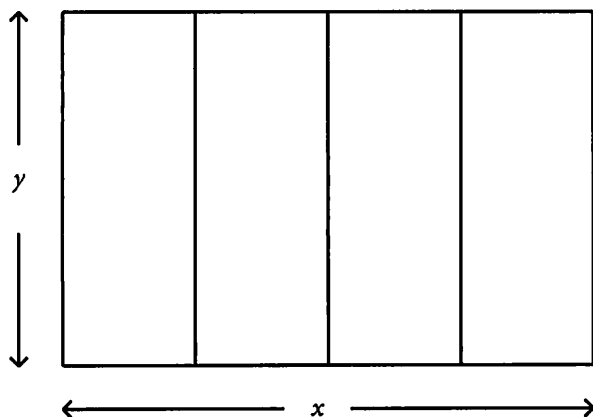
d.



37. If up to 30 apple trees are planted on an acre, each will produce 400 apples a year. For every tree over 30 on the acre, each tree will produce 10 apples less each year. How many trees per acre will maximize the annual yield?

- a. 5 trees
- b. 32 trees
- c. 35 trees
- d. 40 trees

38. An enclosure will be built, as depicted, with 100 feet of fencing. What dimensions will maximize



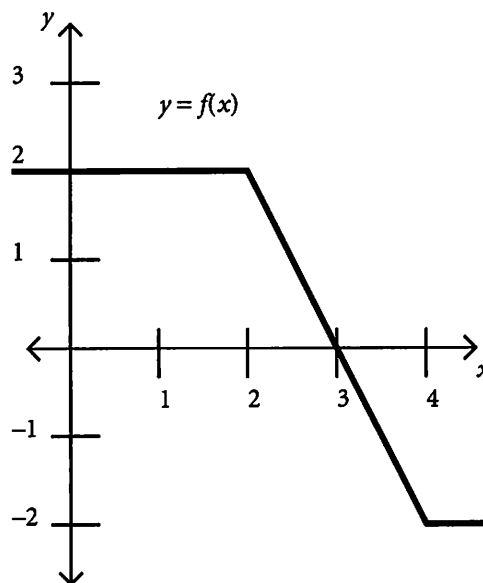
the area?

- a. $x = 20, y = 12$
- b. $x = 25, y = 10$
- c. $x = 30, y = 8$
- d. $x = 35, y = 6$

39. If $\int_1^7 f(x) dx = 2$ and $\int_7^{10} f(x) dx = 8$, then what is $\int_1^{10} f(x) dx$?

- a. 6
- b. 9
- c. 10
- d. 16

40. What is $\int_0^4 f(x) dx$?



- a. 0
- b. 2
- c. 4
- d. 6

41. If $g(x) = \int_0^x t^3 dt$, then what is $g'(x)$?

- a. x^3
- b. $\frac{1}{4}t^4 + c$
- c. $\frac{1}{4}x^4 + c$
- d. $3x^2$

42. Evaluate $\int_1^3 (6x^2 - 4x) dx$.

- a. 16
- b. 32
- c. 36
- d. 40

43. Evaluate $\int \left(x^5 - \frac{1}{x^2} \right) dx$.

- a. $\frac{1}{6}x^6 + \frac{3}{x^3} + c$
- b. $\frac{1}{6}x^6 + \frac{1}{x} + c$
- c. $5x^4 + \frac{2}{x^3}$
- d. $5x^4 + \frac{2}{x^3} + c$

44. Evaluate $\int \cos(x) dx$

- a. $-\sin(x) + c$
- b. $\sin(x) + c$
- c. $-\cos(x) + c$
- d. $\cos(x) + c$

45. Integrate $\int (3e^x - \sin(2x)) dx$.

- a. $3e^x + \cos(2x) + c$
- b. $3e^x - \cos(2x) + c$
- c. $3e^x + \frac{1}{2}\cos(2x) + c$
- d. $\frac{3e^{x+1}}{x+1} - \sin(x^2) + c$

46. Evaluate $\int \frac{\ln(x)}{x} dx$.

- a. $\frac{1}{x} + c$
- b. $\frac{1}{2}x^2 + c$
- c. $(\ln(x))^2 + c$
- d. $\frac{1}{2}(\ln(x))^2 + c$

47. Evaluate $\int x e^{(x^2)} dx$.

- a. $e^{(x^2)} + c$
- b. $\frac{1}{2} e^{(x^2)} + c$
- c. $\frac{1}{2} x e^{(x^2)} + c$
- d. $\frac{1}{2} x^2 e^{(x^2)} + c$

48. Evaluate $\int_0^6 \sqrt{4x+1} dx$.

- a. $\frac{62}{3}$
- b. $\frac{248}{3}$
- c. $\frac{125}{6}$
- d. 124

49. Integrate $\int \ln(x) dx$.

- a. $\ln(1) + c$
- b. $\frac{1}{x} + c$
- c. $\frac{1}{2} (\ln(x))^2 + c$
- d. $x \ln(x) - x + c$

50. Evaluate $\int x e^x dx$.

- a. $\frac{1}{2} x e^x + c$
- b. $\frac{1}{2} x^2 e^x + c$
- c. $x e^x - e^x + c$
- d. $x e^x + e^x + c$